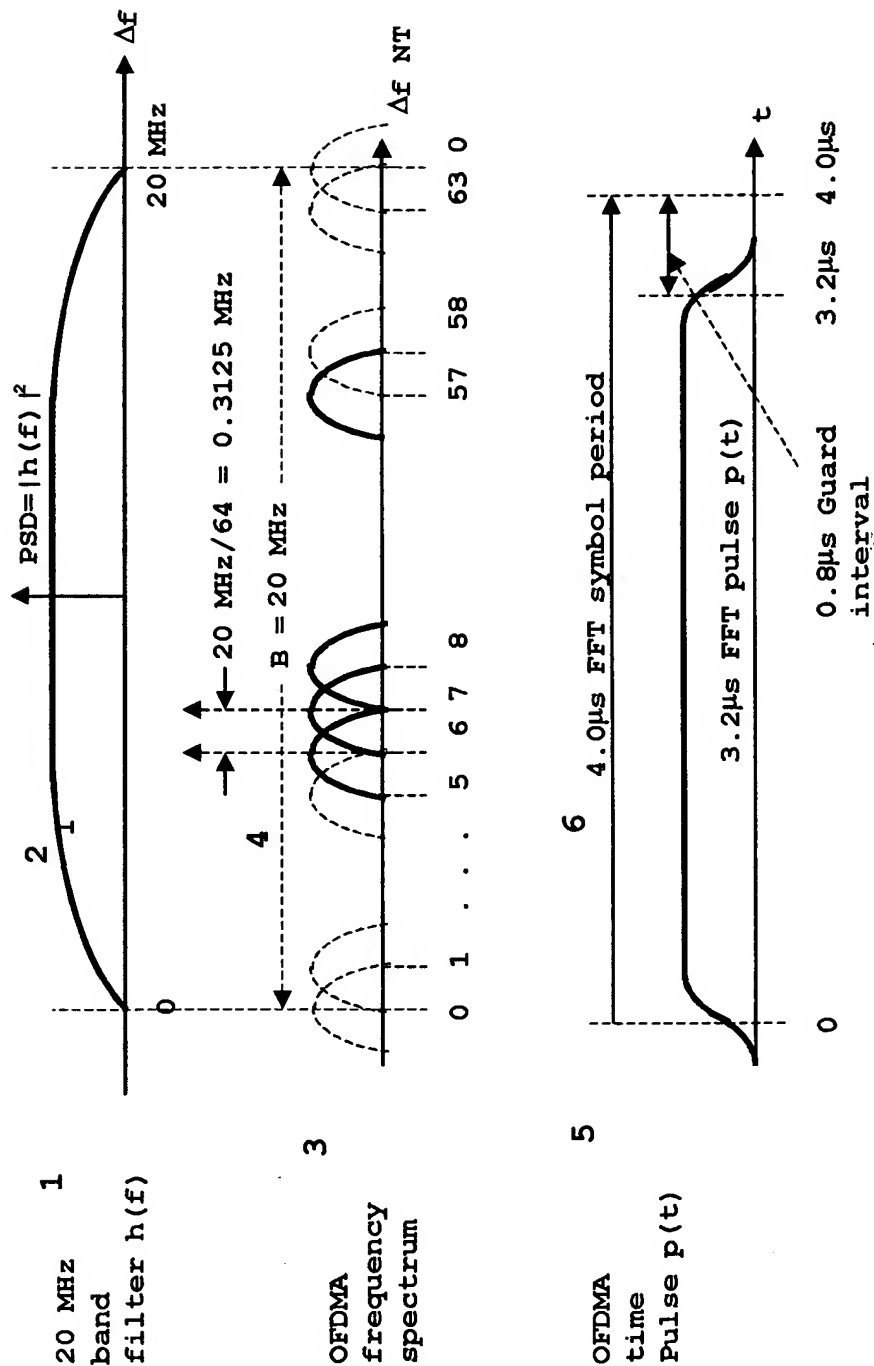


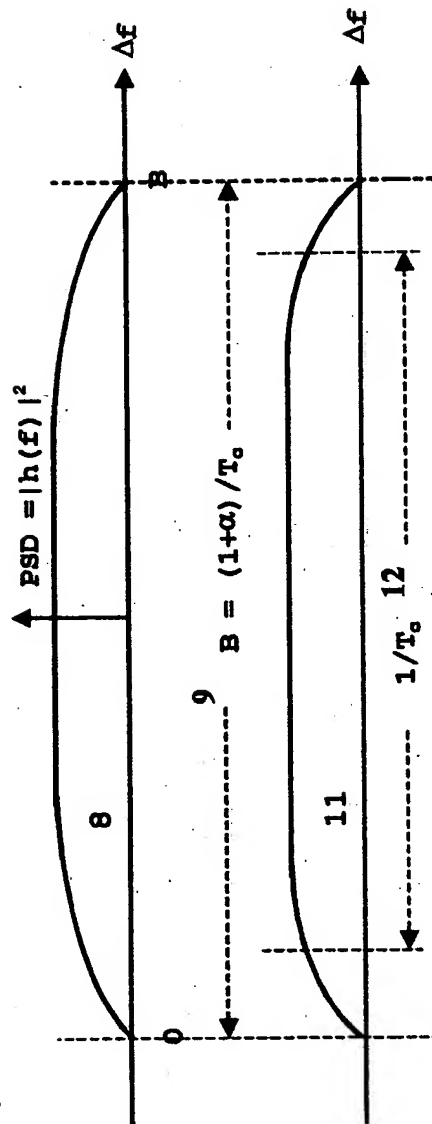
# REPLACEMENT SHEET

FIG. 1 Prior Art: OFDMA waveform



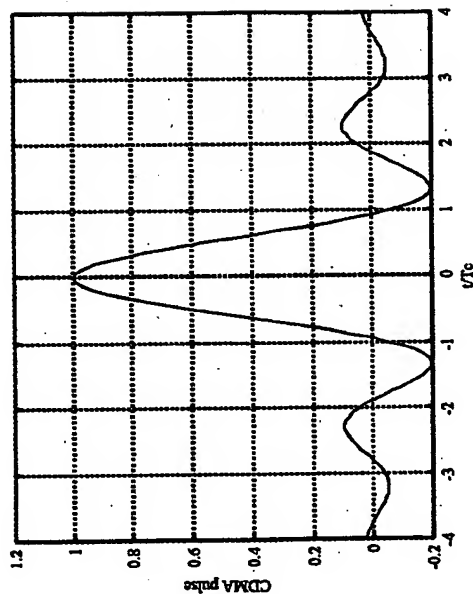
# REPLACEMENT SHEET

FIG. 2 Prior Art: CDMA waveform



7  
Band  
filter  $h(f)$

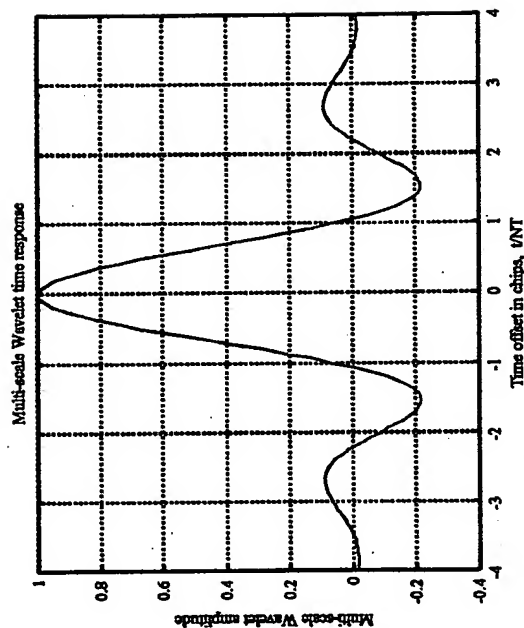
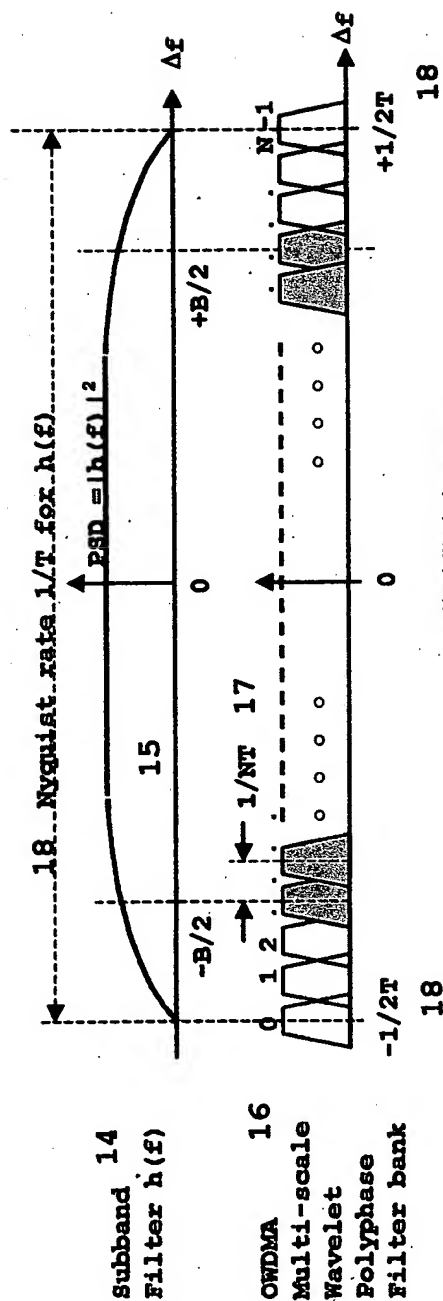
10  
CDMA  
frequency  
spectrum  
 $p(f)$



13  
CDMA  
time  
pulse  
 $p(t)$

# REPLACEMENT SHEET

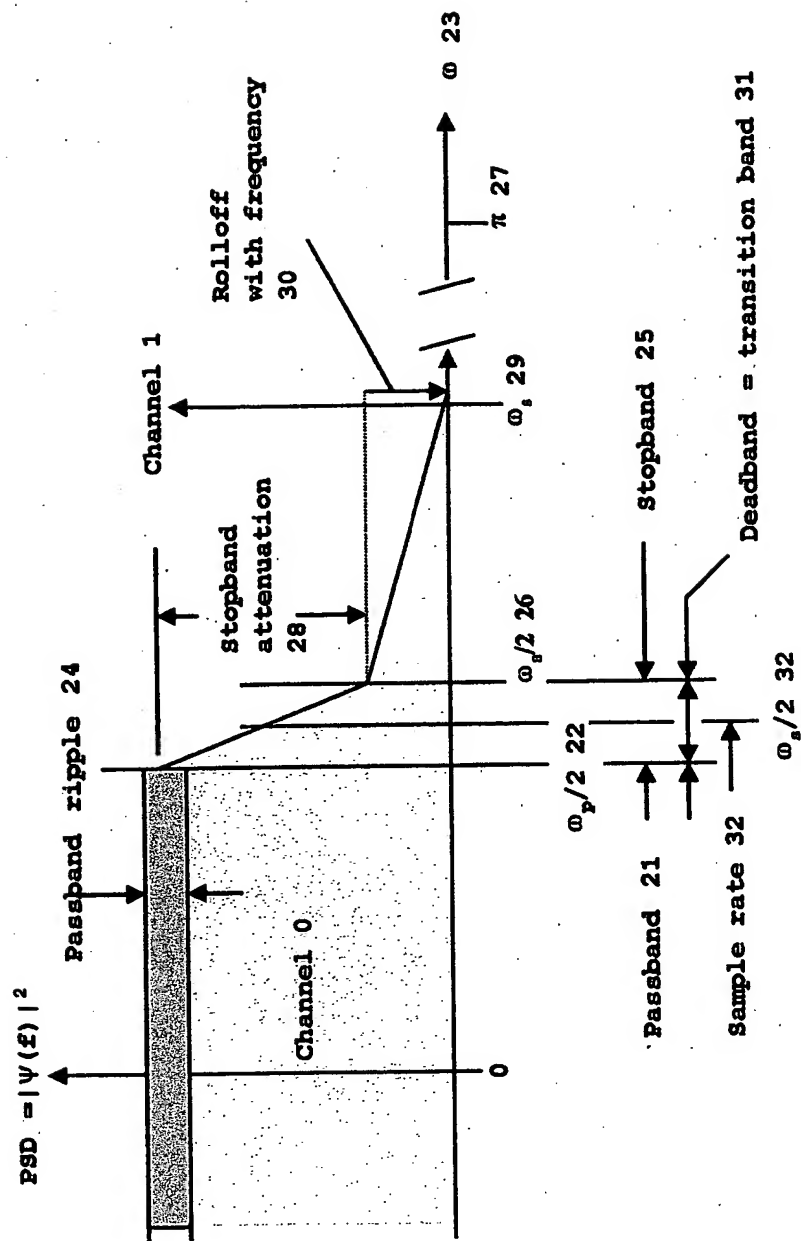
FIG. 3 OWDMA waveform



20

OWDMA  
Multi-scale  
Wavelet  
 $\psi(t)$

FIG. 4 Wavelet  $\text{PSD} = |\Psi(f)|^2$  requirements for communications



# REPLACEMENT SHEET

FIG. 5 PSD for New Waveform (Wavelet waveform) and Square-Root Raised Cosine (Sq-Rt R-C)

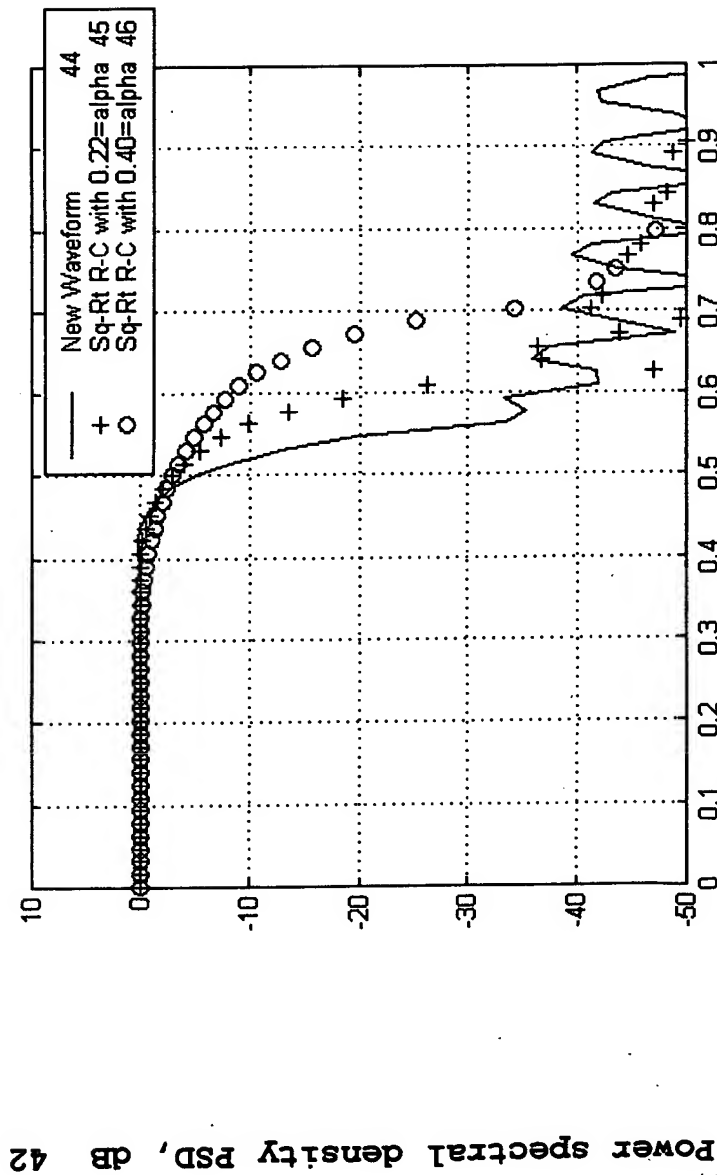
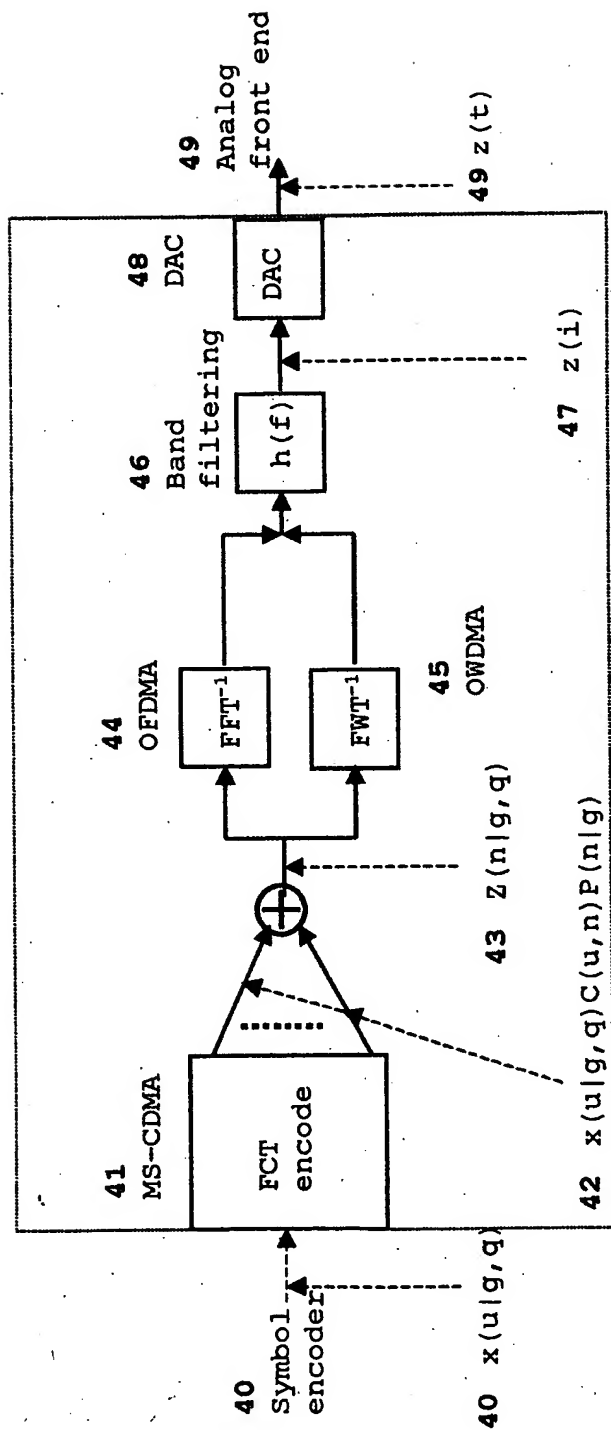
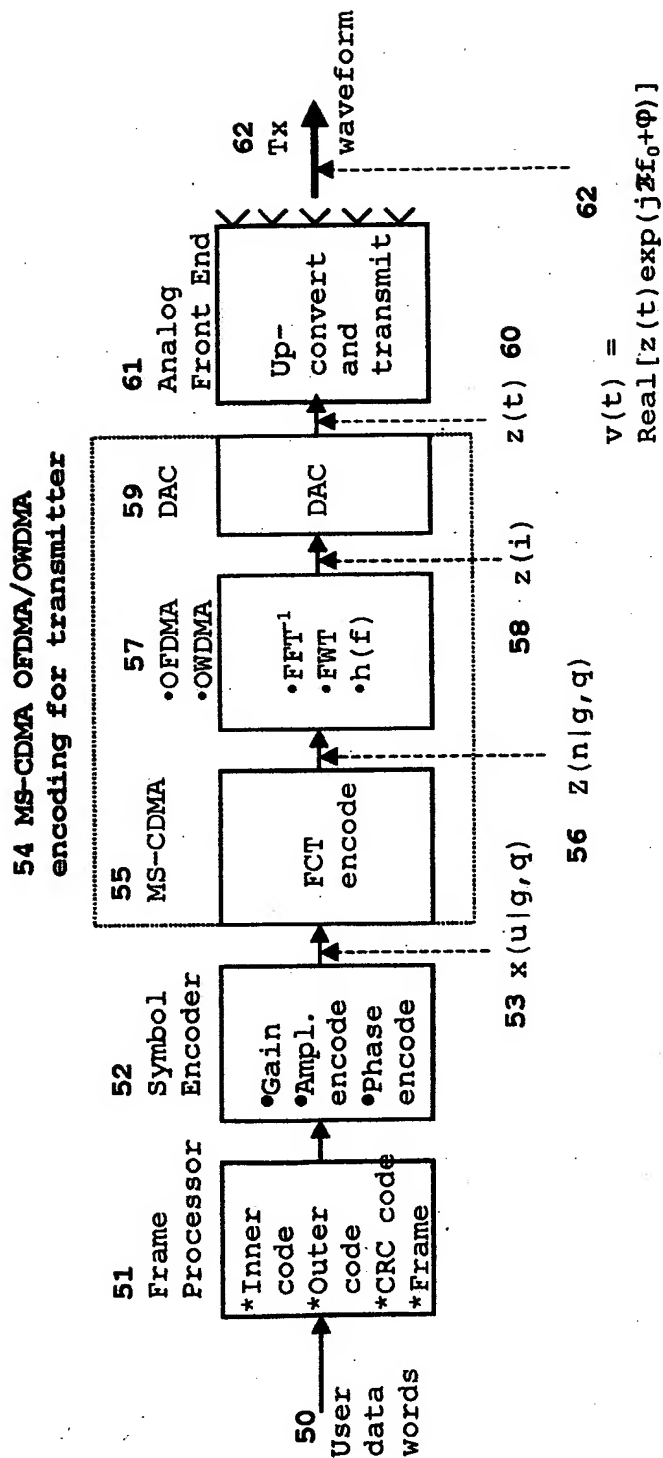


FIG. 6 MS-CDMA OFDMA/OWDMA Encoding for Transmitter



# REPLACEMENT SHEET

FIG. 7A MS-CDMA OFDMA Transmitter: Block Diagram



## REPLACEMENT SHEET

FIG. 7B MS-CDMA OFDMA/OWDMA Transmitter: MS-CDMA Mapping

## MS-Mapping Example

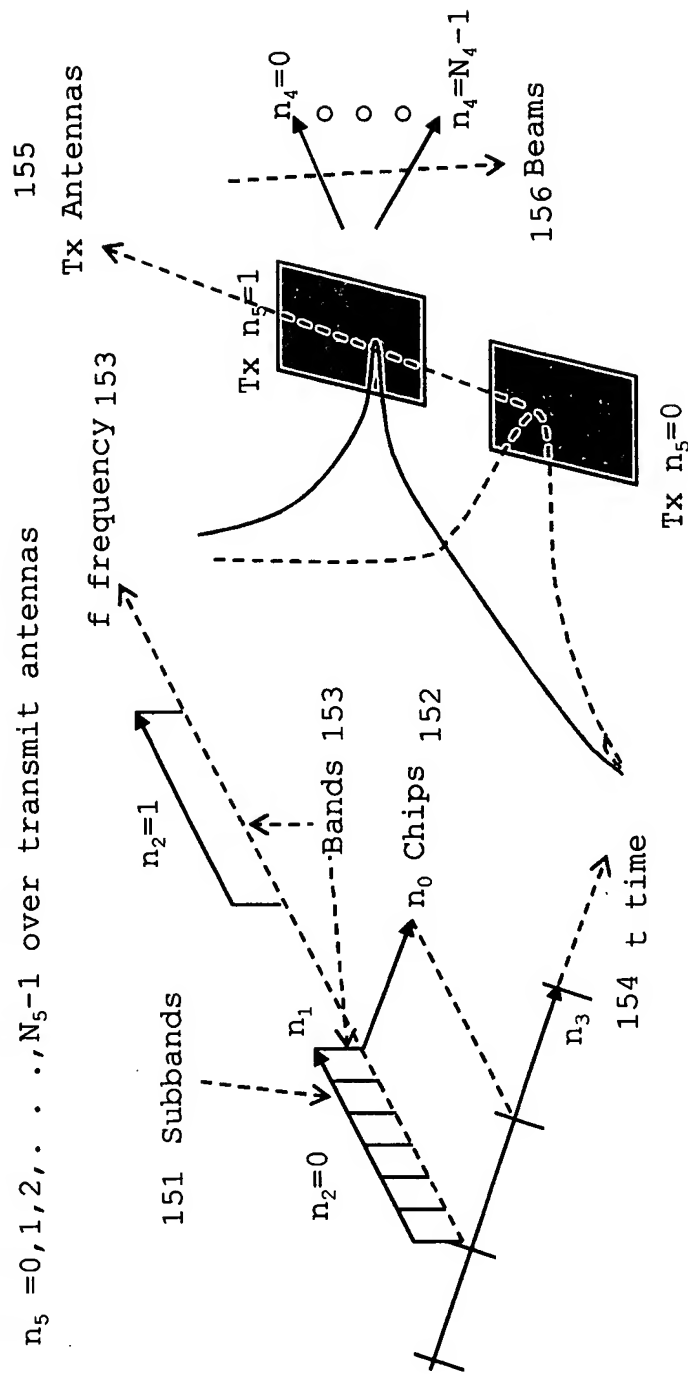
$$\begin{aligned} n_0 &= 0, 1, 2, \dots, N_0-1 \text{ over chips within each channel} \\ n_1 &= 0, 1, 2, \dots, N_1-1 \text{ over subbands within frequency band} \\ n_2 &= 0, 1, 2, \dots, N_2-1 \text{ over frequency bands} \\ n_3 &= 0, 1, 2, \dots, N_3-1 \text{ over data blocks} \\ n_4 &= 0, 1, 2, \dots, N_4-1 \text{ over beams of transmit antenna} \\ n_5 &= 0, 1, 2, \dots, N_5-1 \text{ over transmit antennas} \end{aligned}$$




FIG. 8 MS-CDMA OFDMA/OWDMA Decoding for Receiver

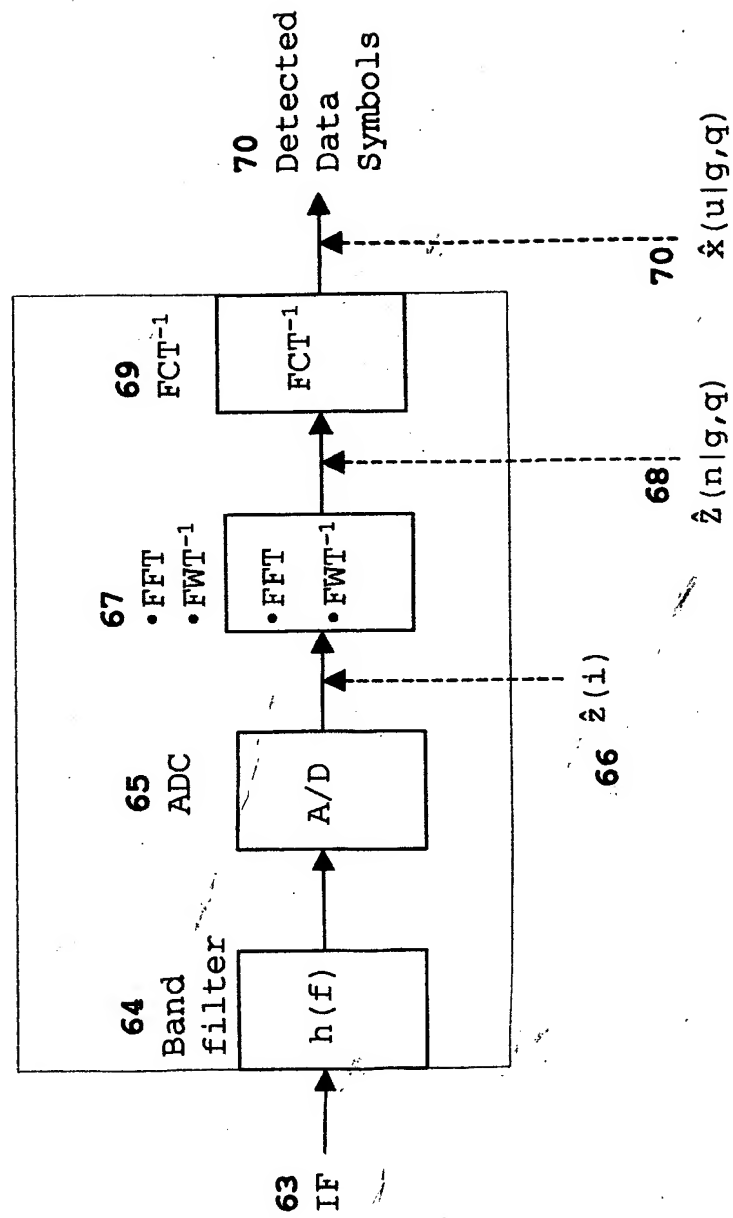


FIG. 9 MS-CDMA OFDMA/OWDMA Receiver Block Diagram

